



The following sample(s) was/were submitted and identified on behalf of the client as:

TEST REPORT	
Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)	
Report Reference No:	GZES191102767231
Tested by (name + signature)	Chico Li 
Approved by (+ signature)	Anlay Dong 
Date of issue.....:	2020-01-07
Total number of pages.....:	23
Testing Laboratory	SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch
Address.....:	198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China
Applicant's name	Hangzhou Hikvision Digital Technology Co., Ltd.
Address.....:	No.555 Qianmo Road, Binjiang District, Hangzhou 310052, China
Test specification:	
Test procedure	Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)
Non-standard test method.....:	None
Test Report Form No:	EN50153_A
Test Report Form(s) Originator	SGS-CSTC
Master TRF.....:	2018-04-03
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Test item description.....:	Network Camera
Model/Type reference.....:	DS-2XM6112G0-I/ND, DS-2XM6112G0-I/NDUHK, DS-2XM6112G0-I/NDCKV, DS-2XM6112G0-I/NDUVS, DS-2XM6112G0-I/NDKVO, DS-2XM6112G0-I/NDHUN, DS-2XM6112G0-IM/ND, DS-2XM6112G0-IM/NDUHK, DS-2XM6112G0-IM/NDCKV, DS-2XM6112G0-IM/NDUVS, DS-2XM6112G0-IM/NDKVO, DS-2XM6112G0-IM/NDHUN, DS-2XM6122G0-I/ND, DS-2XM6122G0-I/NDUHK, DS-2XM6122G0-I/NDCKV, DS-2XM6122G0-I/NDUVS, DS-2XM6122G0-I/NDKVO, DS-2XM6122G0-I/NDHUN, DS-2XM6122G0-IM/ND, DS-2XM6122G0-IM/NDUHK, DS-2XM6122G0-IM/NDCKV, DS-2XM6122G0-IM/NDUVS, DS-2XM6122G0-IM/NDKVO, DS-2XM6122G0-IM/NDHUN, DS-2XM6112FWD-I/ND, DS-2XM6112FWD-I/NDUHK, DS-2XM6112FWD-I/NDCKV, DS-2XM6112FWD-I/NDUVS, DS-2XM6112FWD-I/NDKVO, DS-2XM6112FWD-I/NDHUN, DS-2XM6112FWD-IM/ND, DS-2XM6112FWD-IM/NDUHK, DS-2XM6112FWD-IM/NDCKV, DS-2XM6112FWD-IM/NDUVS, DS-2XM6112FWD-IM/NDKVO, DS-2XM6112FWD-IM/NDHUN, DS-2XM6122FWD-I/ND, DS-2XM6122FWD-I/NDUHK, DS-2XM6122FWD-I/NDCKV, DS-2XM6122FWD-I/NDUVS, DS-2XM6122FWD-I/NDKVO, DS-2XM6122FWD-I/NDHUN, DS-2XM6122FWD-IM/ND, DS-2XM6122FWD-IM/NDUHK, DS-2XM6122FWD-IM/NDCKV, DS-2XM6122FWD-IM/NDUVS, DS-2XM6122FWD-IM/NDKVO, DS-2XM6122FWD-IM/NDHUN

Ratings.....: PoE (36 Vd.c. – 57 Vd.c.); 0,2 – 0,1A; 5 W
 Brand name: HIKVISION
 Manufacturer.....: Same as applicant
 Factory: Hangzhou Hikvision Technology Co., Ltd.
 No.700, Dongliu Road, Binjiang District, Hangzhou Ctiy, Zhejiang,
 310052, China

 Hangzhou Hikvision Electronics Co., Ltd.
 No.299, Qiushi Road, Tonglu Economic Development Zone,
 Tonglu County, Hangzhou, Zhejiang, 310052, China

 Chongqing Hikvision technology Co., Ltd.
 No. 118, Haikang Road, Area C, Jianqiao Industrial Park,
 Dadukou District, Chongqing, 401325, China

Summary of testing:

The sample(s) in this report has considered and complied below tests and requirements according to Railway applications –Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017).

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

Model DS-2XM6112G0-I/ND was selected for test as representative.

Stabilized PoE power source was used for test.

Tests performed:

Selected verdict	Sub-clause	Test name
<input checked="" type="checkbox"/>	5.3.1.1, 5.3.2.1	Protection by the use of closed electrical operating areas
<input type="checkbox"/>	5.3.1.3	Clearance for live parts on the outside of the vehicle
<input checked="" type="checkbox"/>	Cl. 5.4.1	SELV measurement
<input checked="" type="checkbox"/>	Cl. 5.4.3	Additional requirements for PELV
<input type="checkbox"/>	Cl. 6.4.4	Impedance between the unit and the protective conductor of the fixed installation

Copy of marking plate



Remark: the above marking plate is only a draft artwork to show the product ratings and model No.

Marking for other models are the same except model number.

Possible test case verdicts:

- test case does not apply to the test object: N (or N/A)
- test object does meet the requirement: P (Pass)
- test object does not meet the requirement: F (Fail)

Testing

Date of receipt of test item: 2019-11-22

Date (s) of performance of tests: 2019-11-22 to 2019-12-13

General remarks:

The test results presented in this report relate only to the object tested.
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 "(see Enclosure #)" refers to additional information appended to the report.
 "(see appended table)" refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

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General product information:

Function:	Network Camera main function is collecting real-time video signals, Power by stabilized PoE then through Signal terminal transmission to PC online surveillance
Power Source:	Stabilized Power over Ethernet
Installation:	Used on rolling stock inside railway vehicles, body mounted
Construction:	Metal enclosure fixed by screws
Protective provisions against direct contact by	Use of band I (PELV) and Additional requirements for PELV

Model differences:

All models are identical except model name and software version.

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
4	Classification of voltage bands		—
4.1	General principles		P
	The power supply source	Stabilized PoE	P
	voltages bands	I	P
4.2	Connections between circuits		P
	Circuits operating at different nominal voltages connected by power conversion equipment which provides a sufficient insulation between them are individually classified at the nominal voltage of each circuit.	Circuits operating at same nominal voltages and power by band I	P
	If the conducting paths referred to in this subclause include capacitive or inductive connections, whose impedance is low enough to induce hazardous voltages into any circuit under either normal or fault conditions, then all the circuits so connected are classified at the nominal voltage of the highest voltage circuit.	No such capacitive or inductive connections	N/A
	Where circuits are linked conductively to a higher voltage source other than directly by circuit bonds connected to the vehicle body (for example by an auto-transformer or potential divider), all circuits in the group are treated as if energized at the nominal voltage of the source, unless the conditions of 4.3 have been met.	No such circuit	N/A
4.3	Exceptions		
	If voltage conversion from one band to another involves overvoltage detection resulting in disconnection of the primary or the secondary circuit, or having other means capable of preventing excessive voltage in the secondary circuit, then the secondary circuit is permitted to be classified according to the highest voltage at which the detection equipment will operate. Where overvoltage detection is used the integrity of the equipment should be evaluated as appropriate.		N/A
	Circuits not connected to the vehicle body, for example floating supplies, are permitted to be classified in any voltage band. The band selected should be appropriate, taking due account of the various potentials possible in such circuits under normal or fault conditions so as to ensure that the requirements of this European Standard are met.		N/A
	The limit between bands III and IV is allowed to be lowered to take account of special national conditions		N/A
5	Protective provisions against direct contact		—

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
5.1	General	Band I voltage, use protection in accordance of sub-clause 5.4.	P
	Live parts capable of causing an electric shock shall be protected against direct contact.		P
	All types of equipment shall be capable of being operated without loss of protection against direct contact.		P
5.2	Protection by insulation		N/A
	the insulating materials used to cover live parts shall be appropriate to the rated equipment operating voltage and the conditions of use.		N/A
5.3	Protection by prevention of access		N/A
5.3.1	Voltages in bands I to III		N/A
5.3.1.1	Protection by the use of closed electrical operating areas		N/A
	Live parts within the vehicle, energized with voltages in bands I to III shall be contained within closed electrical operating areas.		N/A
	Access to closed electrical operating areas containing energized live parts is permitted as follows:		N/A
	– band I and II: access is permitted to (electrically) instructed persons and skilled persons;		N/A
	– band III: access is only permitted to (electrically) instructed persons and skilled persons provided that precautions against unintended direct contact are taken.		N/A
	Means of preventing access: <ul style="list-style-type: none"> - in areas within vehicles, accessible to ordinary persons, screens and covers shall conform to the degree of protection IP4X according to EN 60529, - where these are electrically connected to the vehicle body, to the degree of protection IP2XD according to EN 60529 	Passed IP 2XD test of EN 60529 for electrically connected to the vehicle body	P
	in other areas where grid or mesh screens are used, these shall be placed at a sufficient distance to prevent any direct contact, taking into account possible buckling or warping		N/A

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
5.3.1.2	Protection by the use of electrical operating areas		N/A
	live parts contained within an electrical operating area the following shall apply:		N/A
	- Live parts energized within bands I and II need no protection against direct contact provided that the requirements of 8.5.2 are met.		N/A
	- The use of (electrically) protective obstacles to afford a limited protection against direct contact with live parts at band III voltages may be acceptable in electrical operating areas inaccessible to ordinary persons by their location (such as underframe cases, roofs, interiors of motor units, excluding driver's cabs), provided that the hazard is readily identifiable.		N/A
5.3.1.3	Protection by clearance		N/A
	For live parts on the outside of the vehicle (e.g. current collectors, roof conductors, resistors) which are potentially accessible to persons in a straight line from any standing surface in, on or by vehicles, protection against direct contact by means of clearance shall be provided if no other protective measures as defined in this European Standard are used.		N/A
	Protection by clearance is considered to be provided, if at least the clearances from standing surfaces to live parts depicted in EN 50122-1:2011, Figure 3,		N/A
5.3.1.4	Protection against hazards from power supply bus line		N/A
	Access to live parts that may be energized with voltage band III when the supply system is likely to be energized from an external source (e.g. another vehicle, preheating equipment, shed supply, etc.) shall be prevented by an interlocking device or a procedure.		N/A
	Connectors in the power supply bus line shall be fitted with warning labels in accordance with 5.5.		N/A
5.3.2	Voltages in band IV		N/A
5.3.2.1	Protection by the use of closed electrical operating areas		N/A

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
	Access to live parts energized with voltages in band IV shall be excluded to all persons including skilled persons.		N/A
	Access to live parts normally energized with voltages in band IV shall only be possible to (electrically) instructed persons and skilled persons after the live parts have been de-energized and made safe by one or more of the following methods: – procedure; – interlocking devices; – protective-equipotential-bonding; – safety or monitoring devices.		N/A
	Means of preventing access and making safe live parts shall comply with the following:		N/A
	- covers in areas accessible to ordinary persons in vehicles shall conform to the degree of protection IP4X according to EN 60529;		N/A
	- areas accessible to instructed persons and skilled persons shall conform to the degree of protection IP2X according to EN 60529		N/A
	- protection of equipment requiring infrequent intervention may consist of screwed or bolted panels. It shall only be possible to remove these panels by use of a tool		N/A
	- for equipment requiring frequent intervention, a locking system shall be provided to ensure that live parts become accessible only after the electrical supply to the live parts has been isolated and the live parts have been made safe by protective bonding. The locking system shall allow tests to be performed on vehicle control equipment;		N/A
	- In cases where band III voltages are not eliminated after band IV live parts have been de-energized, the precautions of 5.3.1 shall be taken to prevent direct contact with live parts which remain energized with voltages in band III		N/A
5.3.2.2	Protection by clearance		N/A
	For live parts on the outside of the vehicle (e.g. current collectors, roof conductors, resistors), which are potentially accessible to persons in a straight line from any standing surface in, on or by vehicles, protection against direct contact by means of clearance shall be provided.		N/A

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
	Protection by clearance is considered to be provided, if at least the clearances from standing surfaces to live parts depicted in EN 50122-1:2011, Figure 4, are maintained		N/A
5.3.2.3	Protection against hazards from power supply bus line		N/A
	Access to live parts when the supply system is likely to be energized from an external source via a power supply bus line (e.g. another vehicle, preheating equipment, shed supply, etc.) shall be prevented by an interlocking device or procedure.		N/A
	For equipment requiring frequent intervention, such as electric train supply jumpers, interlocking devices or procedures shall be provided to ensure that the live parts of the equipment become accessible only after their power supply has been cut off and the live parts have been made safe by protective bonding.		N/A
5.4	Protection by the use of band I (ELV)		P
5.4.1	Requirements for circuits of band I (SELV and PELV)		P
	- the sources for SELV and PELV shall meet the requirements of 414.3, sources for SELV and PELV, of HD 60364-4-41:2007	Input power sources for PELV meet the requirements of 414.3 of HD 60364-4-41:2007	P
	- the circuit shall meet the requirements of 414.4, requirements for SELV and PELV circuits, of HD 60364-4-41:2007	The circuits meet the requirements of 414.4, requirements for PELV circuits, of HD 60364-4-41:2007	P
	- the circuit shall meet the requirements of Clause 8 of this European Standard	After disconnection from the supply cannot cause electric shock	P
5.4.2	Additional requirements for SELV	PELV circuit	N/A
	A SELV circuit shall not be connected to the protective bonding circuit (vehicle body). For SELV circuits at a voltage in band I no further protective provision is required provided that the circuit meets the requirements of 5.4.1.	PELV circuit	N/A
5.4.3	Additional requirements for PELV		P

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
	One pole of the PELV circuit or one pole of the source of the supply of that PELV circuit shall be connected to the protective bonding circuit. No further protective provision is required provided that the nominal voltage does not exceed 6 V AC or 15 V DC and the circuit meets the requirements of 5.4.1.	Nominal voltage exceed 15 Vd.c. Signal terminal to metal enclosure Measured voltage: 0 Vd.c.	P
	If the voltage exceeds 6 V AC or 15 V DC and ordinary persons have access, protection in accordance with 411.7.2 of HD 60364-4- 41:2007 is required		N/A
5.5	Warning labels		N/A
	Warning labels for electrical hazards shall be in accordance with EN 61310-1.		N/A
	If a hazard is considered to exist, after all interlocking devices or design features have been operated to gain access to equipment, then warning labels shall be fitted to identify the hazard and provide any supplementary information necessary to avoid danger to persons. The labels shall be fitted in positions that ensure that they are clearly visible and will remain so throughout the life of the equipment.		N/A
	Access to elevated vehicle standing surfaces, from which live parts of a contact line system can be reached, shall be marked by means of warning labels.		N/A
	A warning label shall be placed on the access points to any closed electrical operating areas containing voltages in bands III or IV. It is permitted not to provide warning labels where a locking system is used to ensure access is prohibited until the hazardous voltage is no longer present.		N/A
6	Protective provisions against indirect contact		—
6.1	General	Even under failure conditions, unit protection by 2,5 A fuse, exposed conductive parts are incapable of causing electric shock	P
6.2	Protective bonding		P
6.2.1	Equipotential bond		N/A

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
	Bonding to the protective conductor shall be provided for any exposed conductive parts which are capable of causing electric shock through induction, capacitive coupling or contact with live parts under foreseeable failure conditions.		N/A
	All parts of the protective equipotential bonding shall be capable of withstanding all internal and external influences (including mechanical, thermal and corrosive) which may be expected.		N/A
	Conductors of a protective equipotential bonding system whether insulated or bare, shall be readily distinguishable by shape, location, marking or colour. If identification by colour is used, it shall be the bicolour combination green-and-yellow.		N/A
6.2.2	Protective bonding rating		N/A
	Protective bonding shall be dimensioned to provide adequate strength and current carrying capacity to ensure that the exposed conductive parts are incapable of causing electric shock under failure conditions.		N/A
	For characteristic values to support the dimensioning of cross section for protective bonding, see EN 50388.		N/A
	Due regard shall be paid to all currents flowing in the running rail which may affect the rating of the bonding connections.		N/A
6.2.3	Sliding contacts, e.g. earth-return brushes, shall conform to the other requirements of 6.2. The failure of any one such contact shall not cause risk of electric shock.		N/A
6.3	Disconnection of the supply		N/A
	Automatic disconnection of supply shall be provided where a risk of harmful physiological effects to a person could arise when a fault occurs, due to the value and duration of the touch voltage		N/A
6.3.2	Disconnection characteristic		N/A

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)									
Cl.	Requirement-Test	Result-Remark	Verdict						
	A protective device shall automatically disconnect the supply to the circuit or equipment for which the device provides protection against indirect contact so that, in the event of a fault between a live part and an exposed conductive part or a protective conductor in the circuit or equipment, a prospective touch voltage exceeding the maximum band II voltages does not persist for a time sufficient to cause a risk of harmful physiological effect to a person in contact with simultaneously accessible conductive parts.		N/A						
6.4	Main protective bonding		N/A						
6.4.1	Introduction		N/A						
6.4.2	General Vehicle bodies shall be bonded in accordance with 6.4.3 and 6.4.4.		N/A						
6.4.3	Bonding paths There shall be at least two protective bonding paths between a vehicle body and the protective conductors of the fixed installation so that, if a failure occurs in one path, there shall be no risk of electric shock. Both paths shall be visible for inspection		N/A						
6.4.4	Impedance		N/A						
	The impedance between the unit and the protective conductor of the fixed installation, e.g. the running rails, shall be low enough to prevent the existence of a hazardous voltage between them, according to the criteria of EN 50122-1:2011, Clause 9 <table border="1" data-bbox="347 1464 940 1650"> <thead> <tr> <th>Type of vehicle</th> <th>Maximum impedance Ω</th> </tr> </thead> <tbody> <tr> <td>Tractive stock Coaches</td> <td>0,05</td> </tr> <tr> <td>Wagons</td> <td>0,15</td> </tr> </tbody> </table>	Type of vehicle	Maximum impedance Ω	Tractive stock Coaches	0,05	Wagons	0,15	It shall be evaluated by end installation.	N/A
Type of vehicle	Maximum impedance Ω								
Tractive stock Coaches	0,05								
Wagons	0,15								
	The calculated resistance should be smaller than 10 mΩ in DC and 15 kV AC systems and 20 mΩ in 25 kV AC systems.		N/A						
6.4.5	Contact line fault		N/A						

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
	In the event of contact between an external electric traction power supply and a vehicle body (i.e. a broken contact wire), the system design shall reduce any excessive voltage at or within the vehicle body, to the levels required in 6.3 in the shortest practicable time.		N/A
	The vehicle protective bonding shall take account of the above aim, and shall remain intact		N/A
6.5	Clarifications and exceptions with reference to indirect contact		N/A
6.5.1	Parts requiring protective provisions		N/A
	Protective provisions shall be made for exposed conductive parts in the proximity of electrical equipment, for example: sinks, metal cupboards, aerial ground planes and other similar parts.		N/A
	Where no electrical equipment is fixed to covers, doors and cover plates of the electronic equipment, the normal metal screws and locking devices as well as conducting corrosion-proof hinges are considered to be sufficient protective bonding. Where electrical equipment is attached to these movable parts of electronic equipment, the exposed conductive parts of the particular electrical equipment need a protective bonding. The protective bonding to these movable parts of electronic equipment should be made via a protective conductor.		N/A
6.5.2	Parts not requiring protective provisions		P
6.5.2.1	Exceptions of protective provisions		P
	Protective provisions are not needed for exposed conductive parts separated from any source which may cause electric shock.	The exposed conductive parts separated from any source which may cause electric shock.	P
6.5.2.2	Band II voltage		N/A
6.5.2.3	Double insulation Electrical equipment having double or reinforced insulation shall comply with the requirements of EN 50124-1 or HD 60364-4-41		N/A
6.5.2.4	Total insulation (for voltages in band III only) Assemblies of electrical equipment having total insulation shall meet the requirements of EN 61140.		N/A

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
6.5.3	Multi-stage insulation When multi-stage insulation is employed, for example in roof or underframe- mounted traction resistors which are air-insulated, exposed conductive parts located between the basic and supplementary insulation shall be regarded as live parts and the provisions of Clause 5 shall apply.		N/A
6.5.4	Floating supplies Circuits at voltages in bands III or IV not bonded to the vehicle body (floating supplies) shall not be used to provide sole protection against indirect contact.		N/A
	Equipment that is isolated and remains floating should be viewed as not protected with respect to indirect touch.		N/A
6.5.5	Insulated wheel or levitation systems without a protective conductor		N/A
6.5.5.1	In this case, 6.4 does not apply. The vehicle body including its exposed conductive parts shall be insulated from the power supply system.		N/A
	No supply circuit derived from within the unit or vehicle shall be capable of acquiring a voltage above the design range under normal or fault conditions either between poles or with respect to any exposed conductive parts.		N/A
	For trolleybuses or other transport systems with no means of connection to the protective conductor of the fixed installation when stationary, all electrical equipment shall be double insulated. Any failure of either level of insulation shall be detectable either by procedure or by the use of monitoring devices.		N/A
6.5.5.2	Such transport systems shall only be used on power supply systems that meet the requirements of EN 50122-1.		N/A
6.6	Additional requirements – Bearings		N/A
	Bearings on vehicles other than wagons shall not be used to connect exposed conductive parts		N/A
	Bearings on wagons should not be used to connect exposed conductive parts, if there is a risk of damage to the bearings caused by electrical current.		N/A
7	Power circuit		—
7.1	General principles	Powered by stabilized PoE	N/A

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
7.2	Power circuit insulated from the vehicle body or bogie		N/A
7.3	Power circuit using the vehicle body or bogie		N/A
	Current flowing in any paths through the body or bogie frame shall not cause damage or unacceptable deterioration to the structure or any mechanical parts.		N/A
	Voltage differences between two different parts of the body or bogie sections shall not be sufficient to cause electric shock under any normal or failure condition.		N/A
	In the event of contact between an external electric power supply and the vehicle body, additionally 6.4.5 shall apply.		N/A
8	Additional requirements		—
8.1	General Means shall be provided for any live parts which may be sufficiently energized to cause electric shock after disconnection from the supply to be secured against electric shock.		P
8.2	Current collectors		N/A
8.2.1	In addition to the requirements of Clause 5, means shall be provided to separate the overhead current collector from the contact wire and prevent accidental contact of the current collector with the wire.		N/A
8.2.2	Shoe gear adjacent to the platform edge shall comply with 5.3.		N/A
8.3	Capacitors For capacitors, which may retain charge when they become accessible to direct contact, means shall be provided to ensure that there is no risk of electric shock. This may be by means of integral design of discharge circuits, additional circuits or procedure.		N/A

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
8.3.1	An integral discharge circuit shall be a reliable and, if necessary, redundant discharge system connected directly across the capacitors, unless another suitable piece of electrical equipment is connected directly across the capacitors, thus constituting a discharge path. The discharge path shall only include devices which are operated as part of the means of gaining access to the capacitor or related circuits and shall exclude devices which could cause automatic disconnection of the discharge path.		N/A
8.3.2	The discharge system shall be capable, after the equipment has been switched off, of bringing the residual voltage down to 60 V, within a defined time period commensurate with the maintenance methods to be employed.	Supply power less than 60 Vd.c.	N/A
8.3.3	The requirement may also be met by means of additional discharge circuits which may be switched automatically by unlocking operations as described in 5.3, or by separate connectable discharge devices. These methods may also be used to achieve a shorter discharge time		N/A
8.3.4	Where separate connectable devices are used, the equipment shall be fitted with suitable connection points for checking the de-energized condition, and, if necessary, for discharging the equipment.		N/A
8.3.5	In addition to the above, a clearly visible warning label, identifying the hazard and the appropriate procedure shall be permanently attached to the equipment or its cover.		N/A
8.4	Plug and socket devices		--
8.4.1	Portable apparatus The following subclauses cover plug and socket devices for the supply of power to portable equipment from a power source up to band III on the train.		N/A
8.4.1.1	Sockets or couplers providing power supply to various devices used while running the train (ovens, cash registers, bottle heaters, etc.) and for maintenance (vacuum cleaners, etc.) shall be fitted with a protective-equipotential-bonding.		N/A
	As additional protection, these sockets should be protected by a residual current device as recommended in HD 60364-4-41:2007, 415.1.		N/A
	Sockets situated in passenger compartments and reserved for maintenance purposes shall be protected by an external flap or a shutter within the socket		N/A

Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)			
Cl.	Requirement-Test	Result-Remark	Verdict
8.4.1.2	Sockets for electric shavers shall only be supplied from an isolating transformer with protective separation between the input winding(s) and output winding(s), or by other protective measure achieving an equivalent level of protection against electric shock originating from other circuits.		N/A
8.4.1.3	Sockets for the use of portable power tools which might be used outside the train shall be protected by the use of one of the following:		N/A
	– SELV in accordance with 5.4;		N/A
	– automatic disconnection of the supply either by a residual current device or by an interlocking device upon removal of the plug;		N/A
	– safe electrical separation of the circuit by an isolating transformer.		N/A
8.4.2	Vehicle and intervehicle connectors Plug and socket devices for shed or trolley traction and also for train auxiliary supplies which present the risk of electric shock or arcing if disconnected when energized, shall not be disconnected in this condition. This may be achieved by an interlocking device or procedure.		N/A
8.5	Special sources		N/A
8.5.1	General The following subclauses cover the requirements for protection against direct contact for live parts energized by sources for which the rules of Clause 5 are unreasonable or inadequate. Examples are batteries, high voltage sources for electronic equipment, high current inductors, etc.		N/A
8.5.2	Live parts not requiring protective provisions Protective provisions are not required for live parts energized with voltages above band I where the source satisfies the conditions for safe insulation and the current and the stored energy are both limited to safe values according to the criteria contained in IEC/TS 60479-1.		N/A
8.5.3	Live parts requiring protective provisions		N/A
8.5.3.1	Protective provisions are required for live parts energized with voltages in band II or below which have high stored energy and may present a risk of electric shock.		N/A

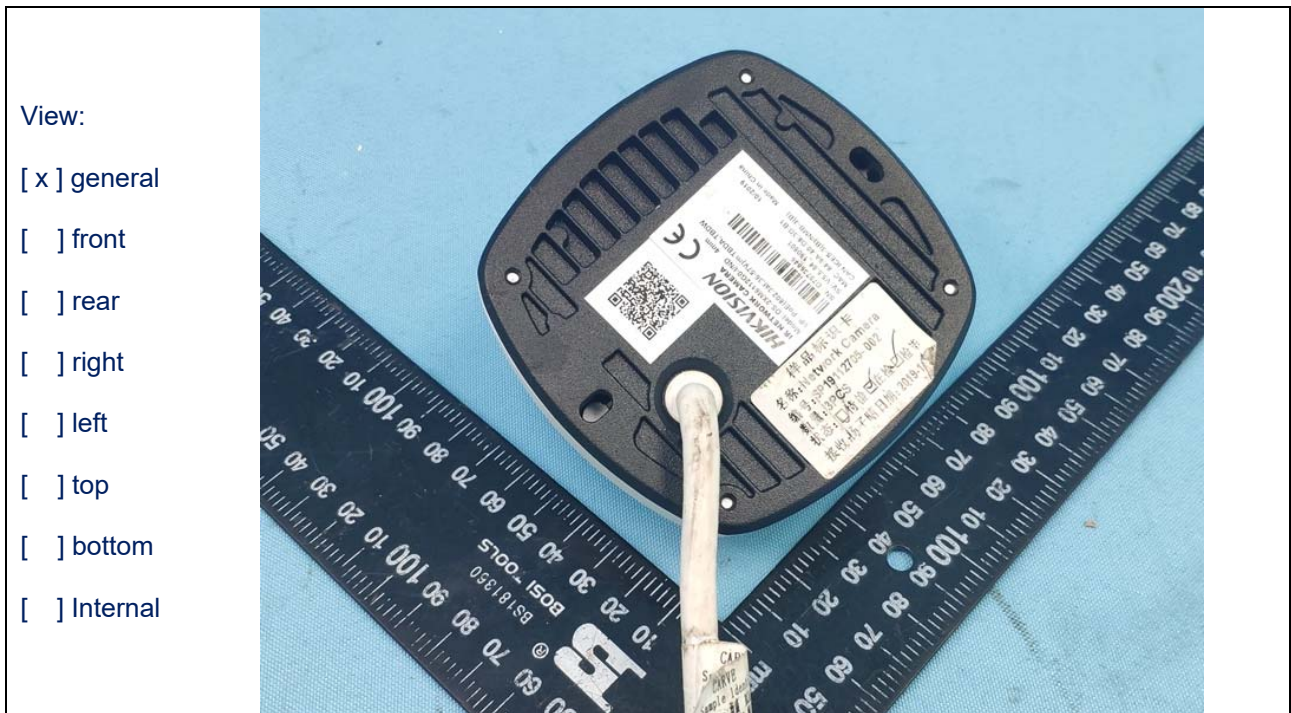
Railway applications - Rolling stock - Protective provisions relating to electrical hazards (EN: 50153:2014 + A1: 2017)																				
Cl.	Requirement-Test	Result-Remark	Verdict																	
8.5.3.2	Protective provisions are required for live parts energized with voltages in band II or below which are not protected by an over current protection device or for which the rating of the over current protection device may still present a hazard, for example battery circuits in which the hazard is mainly from burning by objects making contact.		N/A																	
Annex A Special national conditions																				
4.1	<p>France: Replace Table 1 by:</p> <table border="1"> <thead> <tr> <th rowspan="2">Band</th> <th colspan="2">Nominal voltage U_n</th> </tr> <tr> <th>AC V</th> <th>DC V</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>$U \leq 25$</td> <td>$U \leq 60$</td> </tr> <tr> <td>II</td> <td>$25 < U \leq 50$</td> <td>$60 < U \leq 120$</td> </tr> <tr> <td>III</td> <td>$50 < U \leq 500$</td> <td>$120 < U \leq 750$</td> </tr> <tr> <td>IV</td> <td>$U > 500$</td> <td>$U > 750$</td> </tr> </tbody> </table>	Band	Nominal voltage U_n		AC V	DC V	I	$U \leq 25$	$U \leq 60$	II	$25 < U \leq 50$	$60 < U \leq 120$	III	$50 < U \leq 500$	$120 < U \leq 750$	IV	$U > 500$	$U > 750$		P
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IV	$U > 500$	$U > 750$																		
6.4.3	<p>Great Britain</p> <p>On vehicles that have to operate over the 750 V DC third rail electrified lines in Great Britain, it is permitted to have only a single protective bonding path between a vehicle body and the protective conductors of the fixed installation, as described in Annex D.</p>		N/A																	
Annex B	List of items where contracting parties shall co-operate																			
Annex C	Proposals for design of main protective connections		N/A																	
C.1	General		N/A																	
C.2	Example for main earth connections		N/A																	
C.3	Examples of technical specification for steel earthing wires		N/A																	
Annex D	Operate over 750 V DC third rail electrified lines in Great Britain																			
D.1	Introduction		N/A																	
D.2	Bonding between rail vehicle main body to bogie		N/A																	
D.3	Inter-vehicle bonding		N/A																	

Photo documents:

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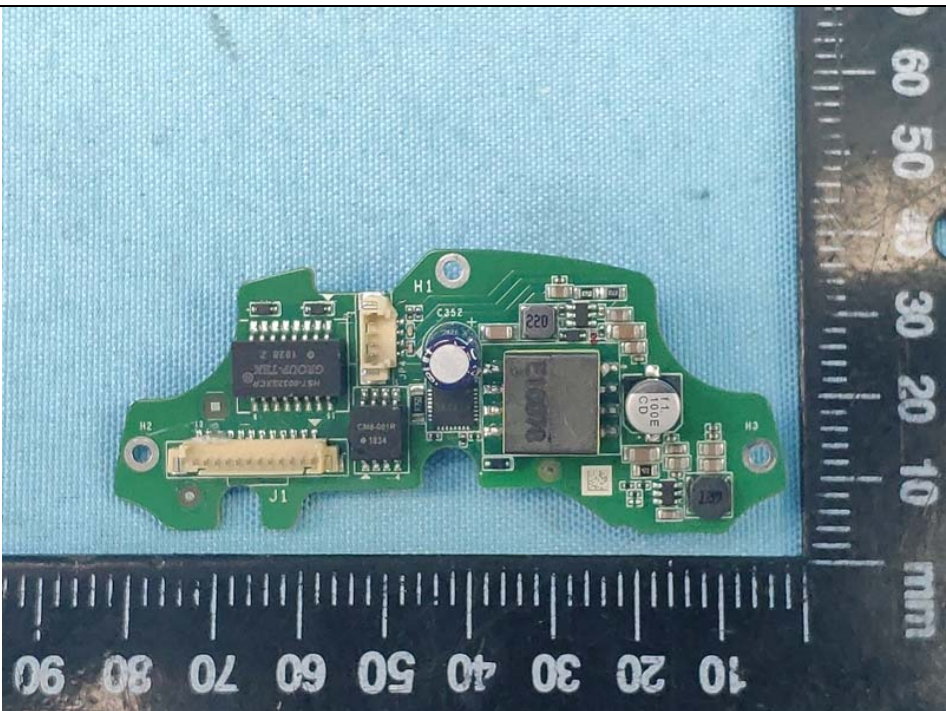
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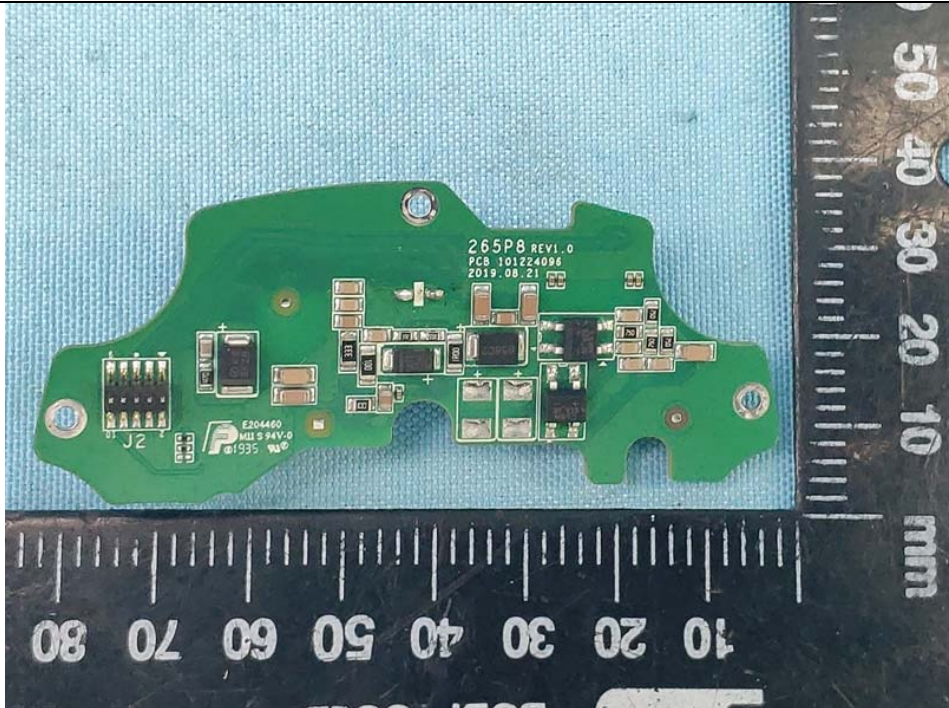
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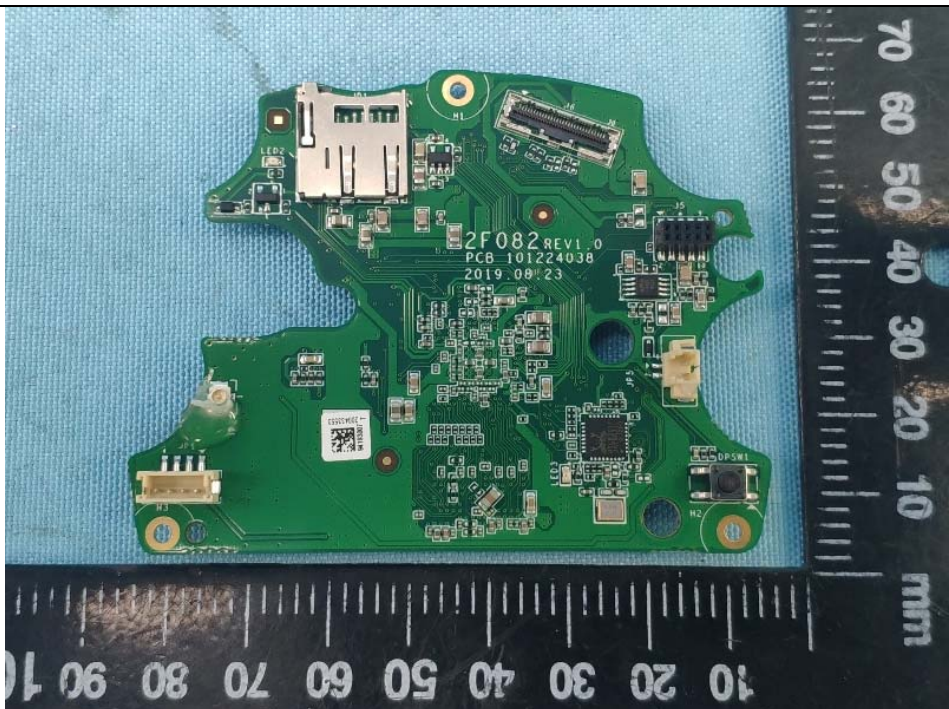
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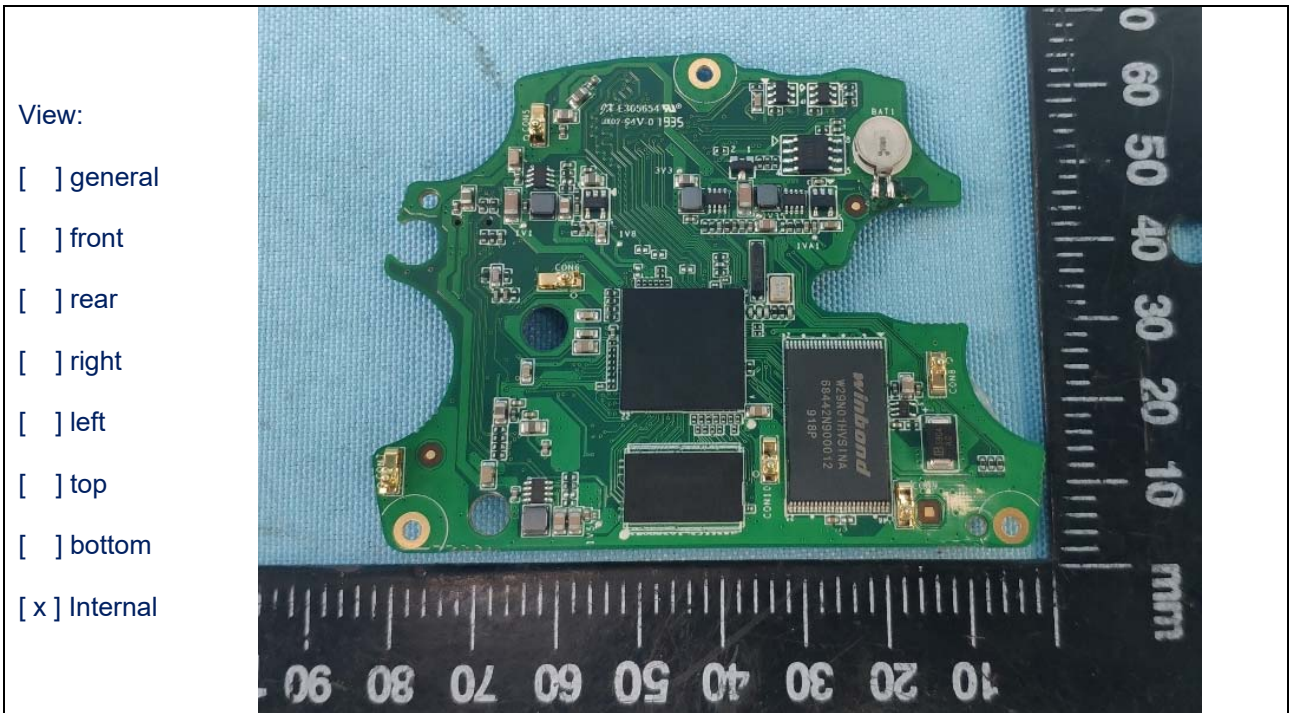
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Details of: PWB



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